
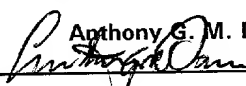



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 06/01/00 00/01/00 06/01/00	UTILITY	Attorney Docket No.	GEMVAL P15AUS		
	PATENT APPLICATION	First Named Inventor or Appln Identified: Roger MASSEY			
	TRANSMITTAL	Title: BAR-STOCK BALL VALVE			
	Only for new nonprovisional applications under CFR 1.53(b)	Express Mail Label No.	EL347242396US		
APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent appln. contents.		ADDRESS TO: Assistant Commissioner for Patents Box Patent Application Washington, DC 20231			
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<input checked="" type="checkbox"/> Customer Number: 020210 Name: DAVIS AND BUJOLD 500 North Commercial Street - 4th floor Manchester, NH 03101-1151 United States of America		<input type="checkbox"/> Correspondence address below Telephone: 603/624-9220 Telefax: 603/624-9229 E-Mail: patent@tiac.net			
Name: Anthony G. M. Davis Signature: 		 020210 Registration No.: 27,868 Date: June 1, 2000			

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: : **Roger MASSEY**

Serial No.:

Group No.:

Filed:

Examiner:

For: **BAR-STOCK BALL VALVE**

**Assistant Commissioner for Patents
Washington, D.C. 20231**

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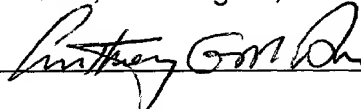
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Specification/Claims/Abstract-10 pgs.;
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Verified Statement Claiming Small Entity Status-3 pgs.**

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05/18/00

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of : Roger MASSEY
Serial no. :
Filed :
For : BAR-STOCK BALL VALVE
Docket : GEMVAL P15AUS

The Commissioner of Patents and Trademarks
Washington, D.C. 20231

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY
STATUS (37 CFR 1.9(c-f) and 1.27(b-d))**

With respect to the invention described in

- ☒ the specification filed herewith.
- ☐ application serial no. filed .
- ☐ patent no. issued .

I. IDENTIFICATION OF DECLARANT AND RIGHTS AS A SMALL ENTITY

I hereby declare that I am

(a) Independent Inventor

- ☐ a below named independent inventor and that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code to the Patent and Trademark Office.

(b) Non-Inventor Supporting a Claim By Another

- ☐ making this verified statement to support a claim by for a small entity status for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code and I hereby declare that I would qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under 41(a) and (b) of Title 35, United States Code, if I had made the above identified invention.

(c) Small Business Concern

- ☐ the owner of the small business concern identified below:
- ☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN Parker & Harper Companies, Inc.

ADDRESS OF CONCERN Otter Court, Raymond, New Hampshire 03077

and that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of the Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

(d) Non-Profit Organization

- ☐ an official empowered to act on behalf of the non-profit organization identified below:

NAME OF ORGANIZATION _____

ADDRESS OF ORGANIZATION _____

TYPE OF ORGANIZATION

- ☐ UNIVERSITY OR OTHER INSTITUTION OF HIGHER EDUCATION
- ☐ TAX EXEMPT UNDER INTERNAL REVENUE SERVICE CODE (26 USC 501(a) AND 501(c)(3))
- ☐ NON-PROFIT SCIENTIFIC OR EDUCATIONAL UNDER STATUTE OF STATE OF THE UNITED STATES OF AMERICA
(NAME OF STATE _____)
(CITATION OF STATUTE _____)
- ☐ WOULD QUALIFY AS TAX EXEMPT UNDER INTERNAL REVENUE SERVICE CODE (26 USC 501(A) AND 501(C)(3)) IF LOCATED IN THE UNITED STATES OF AMERICA
- ☐ WOULD QUALIFY AS NON-PROFIT SCIENTIFIC OR EDUCATIONAL UNDER STATUTE OF STATE OF THE UNITED STATES OF AMERICA IF LOCATED IN THE UNITED STATES OF AMERICA
(NAME OF STATE _____)
(CITATION OF STATUTE _____)

and that the non-profit organization identified above qualifies as a non-profit organization as defined in 37 CFR 1.9(e) for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code.

II. OWNERSHIP OF INVENTION BY DECLARANT

I hereby declare that rights under contract or law remain with and/or have been conveyed to the above identified

- ☐ person ☒ concern ☐ organization
(item (a) or (b) above) (item (c) above) (item (d) above)

EXCEPT, that if the rights held are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held (1) by any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, (2) any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or (3) a non-profit organization under 37 CFR 1.9(e).

- ☒ no such person, concern, or organization
☐ person, concerns or organizations listed below*

*NOTE Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities (37 CFR 1.27)

FULL NAME _____

ADDRESS _____

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NON-PROFIT ORGANIZATION

FULL NAME _____

ADDRESS _____

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NON-PROFIT ORGANIZATION

III. ACKNOWLEDGMENT OF DUTY TO NOTIFY PTO OR STATUS CHANGE

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

IV. DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing hereon, or any patent to which this verified statement is directed.

V. SIGNATURES COMPLETE ONLY (e) or (f) BELOW

(e)

NOTE: All inventors must sign the verified statement

OR

(f)

NOTE: The title of the person signing on behalf of a concern or non-profit organization should be specified.

NAME OF PERSON SIGNING Roger Massey

TITLE OF PERSON Vice President

(if signing on behalf of a concern or non-profit organization)

ADDRESS OF PERSON SIGNING 135 Bow Street, Unit 17

Portsmouth, New Hampshire 03801

DATE May 30, 2000 SIGNATURE Roger Massey

BAR-STOCK BALL VALVE

Field of the Invention

5 The present invention relates generally to barstock body valves and the size of barstock required, and particularly to the size and weight reduction achievable through eccentric (or off-center) machining of the barstock to create the valve body's flow passage. An eccentrically located flow passage results in a thinner wall adjacent to the flow passage, and an
10 initially smaller barstock size.

Background of the Invention

 Valves that feature bodies machined from either hot or cold drawn metal bar, having either circular cross sections or sections formed as
15 regular polygons are commonly referred to as "bar stock" valves. Bar stock valve bodies are particularly amenable to production on high speed automatic machines and therefore offer economies in manufacture not enjoyed by manufacturers of cast and forged valves.

 Traditional bar stock valve bodies place the flow passage substantially along the central axis of the bar. The starting bar size is based
20 on the resulting wall thickness, following machining, necessary to withstand the operating pressures the valve is exposed to in service. Choice of end connection also plays a role in sizing initial bar stock size. The bar size used, however, often is overly sufficient for the wall thickness requirements of
25 the valve.

 This over-design of the valve body frequently results from the need to provide adequate valve stem bearing support and adequate space for stem seals. To accommodate these items, the valve designer often selects
30 a larger bar size, resulting in increased overall weight and cost of the valve body. Due to the manufacturing techniques used, it is inefficient to place the additionally required material locally in the valve body only where needed.

 The over-design becomes more pronounced if an additional (third) port is to be added to a bar stock valve body. The third port typically is

located on the opposite valve body side from the stem, decreasing further the possibility of obtaining sufficient space for the stem bearing support and seals.

5 Summary of the Invention

Wherefore, it is an object of the present invention to overcome the aforementioned problems associated with standard barstock body valves by machining the primary passage of the valve eccentrically (off-centerline) permitting use of initially smaller and lighter barstock material.

10 Another object of the invention is to enable lengthening the stem of selected barstock valves to reduce reaction loads at the valve stem seal, applied from a side load on the outwardly protruding stem. Eccentrically locating the valve through bore provides increased distance between the bore centerline and one outer wall of the valve body. This increased
15 distance permits a correspondingly longer valve stem, reducing stem reaction load at the valve stem seal.

According to the invention there is provided barstock of preselected size and material, an eccentrically located, longitudinally machined through flow bore, a perpendicularly machined stem bore, and inlet/outlet ports
20 centered on the eccentric flow bore located at ends of the valve and machined and sized to match the desired valve connection type.

Also according to the invention there is provided a three way valve option maintaining the barstock weight savings through use of the eccentric machining of the longitudinal flow bore.

25 Also according to the invention there is provided a barstock body fluid control valve comprising: a barstock body of preselected material having an inlet end and an outlet end, and a preselected cross section defining the outer walls; a through machined main flow port located eccentrically on said inlet and said outlet ends; wherein said main flow port eccentric location
30 increases the available barstock thickness at one outer wall location and decreases barstock thickness in the opposite wall.

Brief Description of the Drawings

The invention will now be described, by way of example, with reference to the accompanying drawings in which:

5 Fig. 1 indicates a sectioned elevation view of a typical valve assembly incorporating the invention, containing a body, a flow control ball, valve stem, stem tab, stem seal, flow ports, valve seats and handle and an eccentrically located flow bore centerline;

Fig. 1a indicates a sectioned elevation view of a valve as in Fig. 1 incorporating the invention, but with a third port provided within the body;

10 Fig. 2 indicates an end section view of a two port barstock valve body, centrally bored, incorporating a valve stem length limited to a central bore, the dashed line indicating possible barstock starting size reduction resulting from an eccentrically bored flow port;

15 Fig. 3 indicates the reaction load locations resulting from a side load applied by a valve handle to a stem at the valve handle location;

Fig. 4 indicates the reaction load locations resulting from a side load applied to a stem of increased length from the stem depicted in Fig. 3;

20 Fig. 5 indicates an end section view of the general increased barstock size required to incorporate a longer stem than shown in Fig. 2, if a central flow bore is retained, the dashed line indicating the net smaller barstock size of Fig.2;

25 Fig. 6 indicates an end section view of the invention eccentrically bored flow port providing for an increased length stem, the dashed line indicating approximate barstock size savings compared to the centrally bored flow port of Fig. 5;

Fig. 7 indicates an end section view of the typical barstock size increase necessary to incorporate a third flow port, utilizing a centrally bored through flow port, and noting the extended stem length required to reach the centrally bored flow port; and

30 Fig. 8 indicates an end section view of a reduced barstock size achievable by the invention eccentrically bored main flow port, a third flow

port sized as shown Fig. 7, and the Fig. 6 increased stem length, the dashed line indicating the approximate barstock size reduction achievable through eccentric flow port boring compared to the Fig. 7 relatively larger barstock size.

5

Description of the Preferred Embodiments

Turning first to Fig. 1, a cross-sectional view of a quarter-turn ball valve assembly is shown. The assembly 1 has a valve stem 4 with stem seal 6 installed in valve body 2 with integral valve stem tab 5 engaging a flow control ball 3. The valve stem 4 may be rotated by handle 10 by means of a mating shaped hole, having hole flats that bear on valve stem flats.

In operation handle 10 is rotated to turn ball 3 into position to permit fluid flow between port 7 and port 8. Rotating the stem back to its original position prevents flow between the two ports. Valve seats 9 prevent leakage between the ball 3 and body 2.

Also according to the invention, the throughbore centerline 12 is eccentrically located off the barstock centerline 11, such that, in Fig. 1 configuration of the invention, valve body 2 wall thickness is greater adjacent to the valve stem 4 side of the throughbore centerline 12. This increased wall thickness permits use of a longer stem which serves to diminish the magnitude of reaction forces applied to stem seal 6 in response to eccentric loading of stem 4.

Turning to Fig. 1a, a cross-sectional view of a three-port quarter-turn rotary ball valve assembly is shown. Such an assembly is, in general, a substantially standard barstock valve. The assembly 1 has a valve stem 16 with stem seal 18 installed in valve body 14 with an integral valve stem tab 17 engaging a flow control ball 15. The valve stem 16 may be rotated by handle 22 by means of a mating shaped hole, having hole flats that bear on valve stem flats.

In operation, handle 22 is rotated to turn ball 15 into position to permit fluid flow between port 19 or port 20 via passage 26 and outlet port 25.

Valve seats 21 provide added sealing to prevent fluid leakage between ports 19, 20 and 25.

Also according to the invention, the throughbore centerline 24 is eccentrically located off the barstock centerline 23, such that, in Fig. 1a configuration of the invention, valve body 14 wall thickness is greater adjacent to valve port 25 side of the throughbore centerline 24 than to the valve stem 16 side of the throughbore centerline 24. This increased wall thickness permits inclusion of the third port 25 within the envelope of the valve body 14.

Further according to the invention, a typical centrally bored barstock valve is depicted in Fig. 2 with valve stem 29 length limited to available barstock 31 wall thickness. Retaining valve stem 29 length, Fig. 2 dashed line indicates approximate reduced barstock 31 size achievable by eccentrically boring through port 33 at centerline X in lieu of dashed barstock size centerline Y.

As seen in Figs. 3 and 4, a side load applied by a valve handle results in reaction loads A and B. In Fig. 3 valve stem 39 indicates a standard barstock ball valve stem. Fig. 4 indicates a longer stem 41. Reaction load B in Fig. 4, due to increased stem length, would be reduced from reaction load B in Fig. 3 for the same given side load.

Fig. 5 indicates relative barstock size increase required to use the longer stem 41 with a typically center bored flow path barstock valve body 43. Applying the invention, Fig. 6 indicates the relative reduction in barstock size achievable to incorporate longer stem 41, by eccentrically boring through port 33.

In another application of the invention, Figs. 7 and 8 indicate three-port valves centrally bored (Fig. 7) and eccentrically bored (Fig. 8). To incorporate bottom port 45, Fig. 7 indicates relative barstock size for the body 47 must be increased if center boring of the through port 49 is applied. Fig. 7 further indicates the resulting increase in stem 51 length. Applying the invention, Fig. 8 indicates the relatively smaller barstock body 53 achievable

incorporating the same bottom port 45 of Fig. 7, without the unnecessary length of stem 51 of Fig. 7, but retaining the improved length stem 41 of the single port valve depicted in Fig. 6.

FIG. 6

Reference numerals

	1 assembly	21 valve seats
	2 valve body	22 handle
	3 flow control ball	23 barstock centerline
5	4 valve stem	24 throughbore centerline
	5 stem tab	25 outlet port
	6 stem seal	26 passage
	7 port	29 valve stem
	8 port	31 barstock
10	9 valve seats	33 through port
	10 handle	39 valve stem
	11 barstock centerline	41 long valve stem
	12 throughbore centerline	43 barstock valve body
	13 assembly- 3 port valve	45 bottom port
15	14 valve body	47 body
	15 3-way flow control ball	49 through port
	16 valve stem	51 stem
	17 stem tab	53 body
	18 stem seal	X through port centerline
20	19 port	Y dashed barstock centerline
	20 port	

We claim:

1. A barstock body fluid control valve comprising:

a barstock body of preselected material having an inlet end and an outlet end, and a preselected cross section defining the outer walls;

5 a through machined main flow port located eccentrically on said inlet and said outlet ends;

wherein said main flow port eccentric location increases the available barstock thickness at one outer wall location and decreases barstock thickness in the opposite wall.

10 2. The valve according to claim 1 further comprising a machined stem port perpendicular to said flow port positioned at said increased barstock thickness.

3. The valve according to claim 1 further comprising a machined bottom flow port perpendicular to said flow port; a machined stem port centrally aligned with said bottom flow port, said stem port machined through the opposite outer wall of said barstock body; wherein barstock cross section is minimized adjacent to the stem port.

15 4. A method of reducing initial barstock size in a barstock body fluid control valve which comprises the steps of:

20 cutting barstock of predetermined size, outer wall configuration and material to length;

forming a valve body by machining flat surfaced ends on said barstock perpendicular to said barstock outer wall;

25 aligning to longitudinally bore said barstock along a centerline eccentrically located to position bore closer to said barstock outer wall;

machining a throughbore in said barstock along said eccentric centerline;

30 machining a valve stem bore perpendicular to said throughbore, positioning said valve stem bore a maximum distance from eccentric centerline;

installing a standard size valve stem;

5

5. The valve according to claim 1 in the form of a quarter turn ball valve.

BAR-STOCK BALL VALVE

Abstract of the Disclosure

5

A barstock body fluid control valve comprising a barstock body of preselected material having an inlet end and an outlet end, and a preselected cross section defining the outer walls; a through machined main flow port located eccentrically on the inlet and the outlet ends wherein the

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main flow port eccentric location increases the available barstock thickness at one outer wall location and decreases barstock thickness in the opposite wall.

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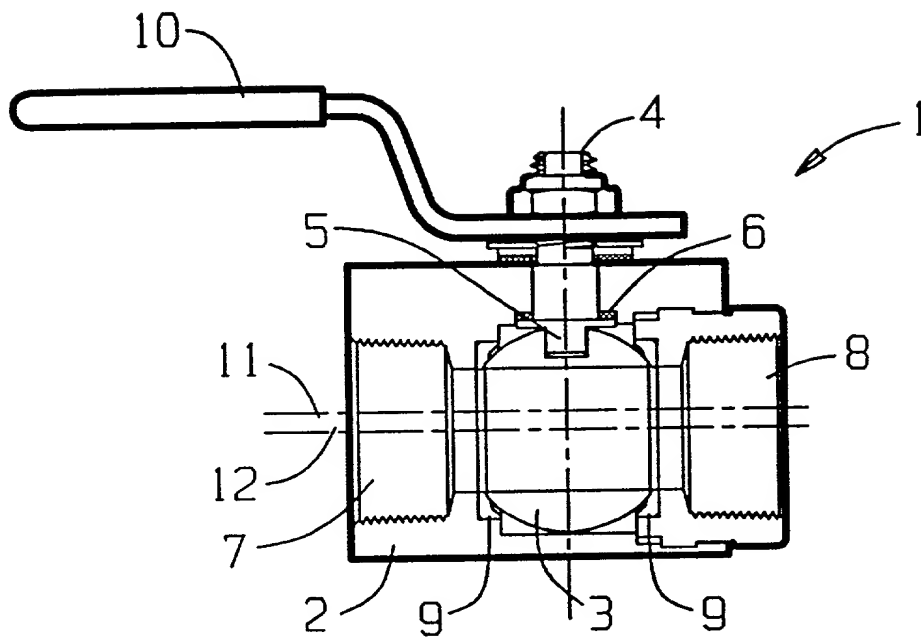


Fig. 1

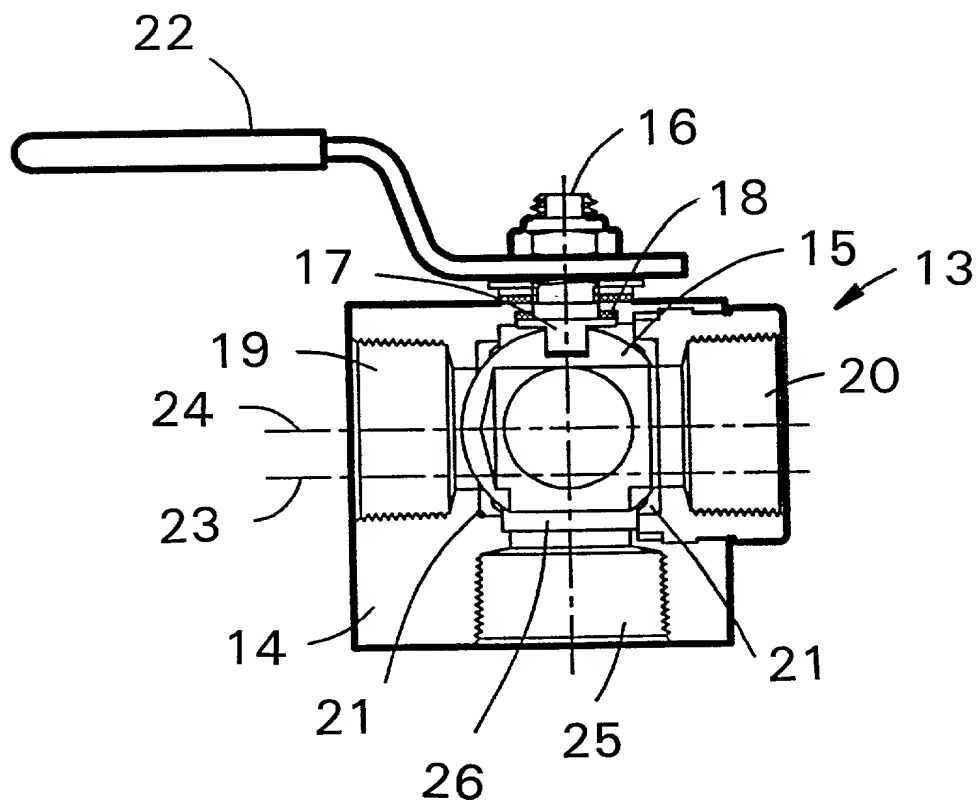


Fig. 1a

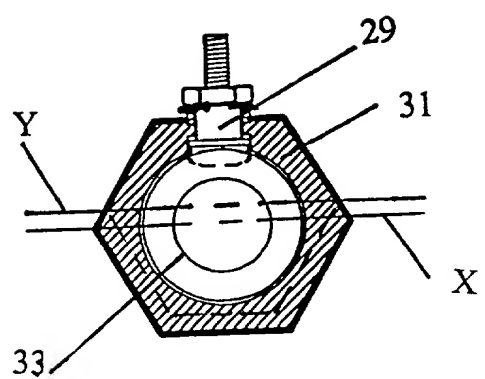


Fig. 2

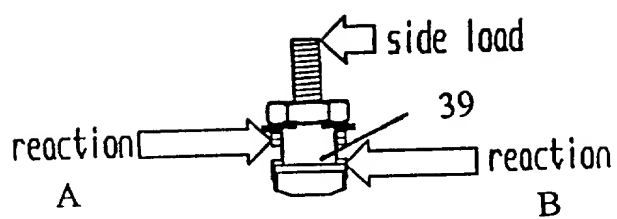


Fig. 3

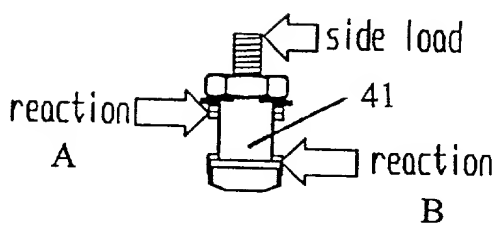


Fig. 4

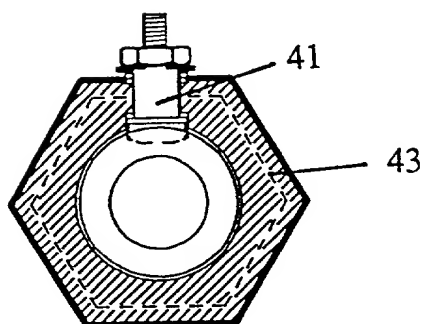


Fig. 5

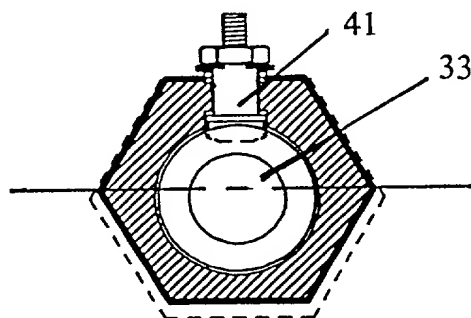
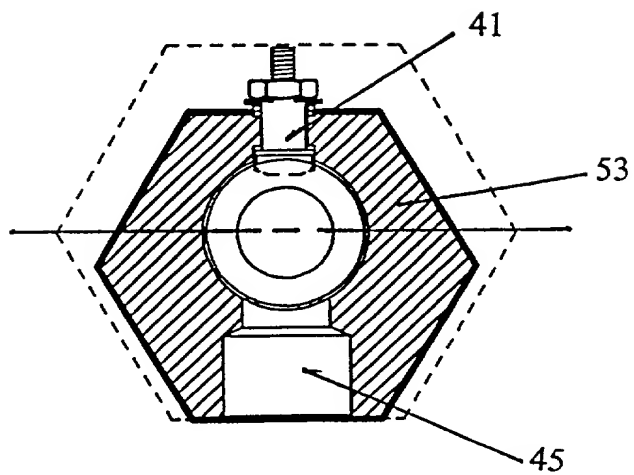
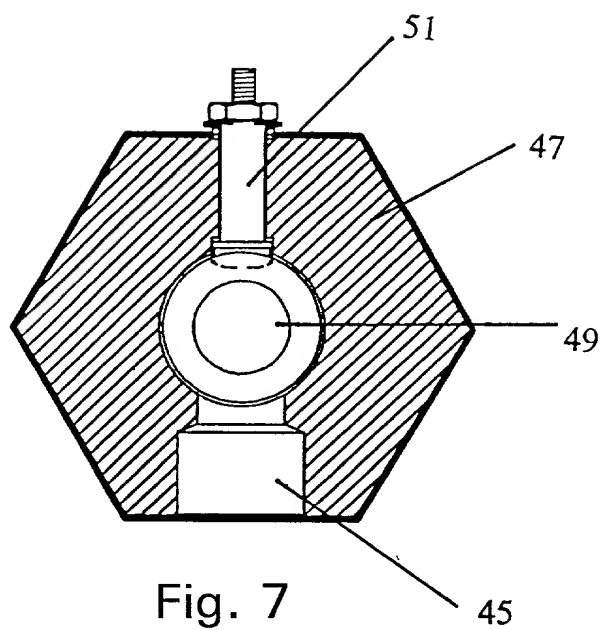


Fig. 6



COMBINED DECLARATION AND POWER OF ATTORNEY

(Original, Design, National Stage of PCT, Supplemental)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is of the following type: (check one applicable item below)

- ☒ original
☐ design
☐ supplemental
☐ National Stage of PCT
☐ divisional (see added page)
☐ continuation (see added page)
☐ continuation-in-part (see added page)

INVENTORSHIP IDENTIFICATION

My/our residence, post office address and citizenship is/are as stated below next to my/our name. I/We believe that the named inventor or inventors listed below is/are the original and first inventor or inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

BAR-STOCK BALL VALVE

SPECIFICATION IDENTIFICATION

The specification of which: (complete (a), (b) or (c))

- (a) ☒ is attached hereto.
 (b) ☐ was filed on _____ as
 ☐ Serial No. _____ or
 ☐ Express Mail No. _____ as Serial No. (not yet known) and was
 amended on _____ (if applicable).
 (c) ☐ was described and claimed in PCT International Application No. _____ filed on
 _____ and as amended under PCT Article 19 on _____ (if
 any).

POWER OF ATTORNEY

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name(s) and registration number(s))

Anthony G. M. Davis
 Michael J. Bujold
 Scott A. Daniels

Registration No. 27,868
 Registration No. 32,018
 Registration No. 42,462

☐ Attached as part of this Declaration and Power of Attorney is the authorization of the above-named attorney(s) to accept and follow instructions from my representative(s).

Send Correspondence to:

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 (603) 624-9220

Direct Telefaxes to:
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ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I/We hereby state that I/we have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I/We acknowledge the duty to disclose to the United States Patent Office all information which is known to be material to patentability of this application as defined in § 1.56 of Title 37 of the Code of Federal Regulations.

PRIORITY CLAIM

I/We hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me/us on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

EARLIEST FOREIGN APPLICATION(S), IF ANY FILED WITHIN 12 MONTHS (6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION

COUNTRY	APPLICATION NO.	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 37 USC 119
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

ALL FOREIGN APPLICATION(S), IF ANY FILED MORE THAN 12 MONTHS (6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION

☐ I/We hereby claim the benefit, under 35 U.S.C. 119(e), of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YY)	<input type="checkbox"/> Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

DECLARATION

I/We hereby declare that all statements made herein of my/our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of ~~sole~~ joint inventor: Roger MASSEY

Inventor's signature: Roger Massey Date: May 30, 2000

Residence: 135 Bow Street, Unit 17, Portsmouth, New Hampshire 03801

Post Office Address: Same as above Country of Citizenship: United States